AUSTRALIAN LAND PLANARIANS: DESCRIPTIONS OF NEW SPECIES AND NOTES ON COLLECTING AND PRESERVING.

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(Plates vi.-vii. figs. 5-8 and 10.)

Part i. Descriptions of new species, &c.

In 1887 Messrs. Fletcher and Hamilton contributed to this Society a valuable paper embodying their notes and observations on Land Planarians.* Since then the only further work of any note published in New South Wales is a paper by Professor Dendy on a collection made by me on the Blue Mountains.†

In Victoria Professor Spencer and Dr. (now Professor) Dendy, particularly the latter, have done excellent work in publishing descriptions with beautiful coloured plates, of the species found in that colony.‡ Dr. Dendy has also described some species from Tasmania and South Australia.§ Quite recently Prof. Dendy has published preliminary descriptions of New Zealand species.|| During the last few years I have been able to collect many species of our New South Wales planarians, as well as of those occurring in Victoria, and through the kindness of friends have received others from parts of the colony which I have not visited, as well as from Southern Queensland. Amongst these are a number of undescribed species, descriptions and figures of which I now desire to record in our Proceedings.

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* P.L.S.N.S.W. (2 Ser.) Vol. ii. 349.

† *Loc. cit.* Vol. ix. 729.

‡ Trans. & Proc. R. S. Vict. 1889 to 1893.

§ Proc. R. S. Vict. 1893, p. 178, and Proc. Aust. Assoc. Adv. Science 1892, p. 369, and 1893, p. 420.

|| Trans. New Zealand Inst. xxvii. 177, and xxviii. 210; also Annals and Mag. Nat. Hist. (Ser. 6) Vol. xiv. 393.

GEOPLANA ATRATA, n.sp.

(Pl. VII. fig. 10.)

Dorsal surface intense black without any visible markings. Ventral surface, a pair of grey fairly well defined stripes bounding a median black stripe, and in turn bounded on the margins by the black ground colour. The median and paired stripes and marginal spaces of ventral surface about equal widths. A single row of large conspicuous eyes round anterior tip and for some mm. down the sides, but no side grouping could be traced, the eyes possibly being hidden by the dark pigmentation of the body. Pharyngeal aperture in spirit specimens between half and two-thirds from anterior end. Genital aperture not observed. Length 25 mm. by 1 mm. when crawling; same specimen in spirit 19 mm.

Type in Australian Museum, Sydney; register number G. 1509.

At first sight this planarian might readily be mistaken for a *Rhynchodemus*, but its generic identity is at once made sure by the numerous easily distinguished eyes. It is the darkest *Geoplana* with which I am acquainted.

Collected under logs by Mr. J. P. Hill, F.L.S., on Upper Manning River, N.S.W.

GEOPLANA HILLII, n.sp.

(Pl. VII. fig. 5.)

Dorsal surface bright sulphur-yellow, with two brown lines dividing it into three longitudinal areas of about equal width. At the anterior end the lines thicken and then coalesce, forming a brown tip which is in strong contrast to the yellow ground colour. Ventral surface paler yellow than the dorsal, fading to a nearly white watery-looking central longitudinal zone. Eyes numerous and readily seen, extending in a single row round anterior tip, with the usual side grouping, though somewhat sparse, a few mm. from the tip, and then in a single row down the sides and round the posterior end. Pharyngeal aperture in spirit is midway between the ends, and the genital opening half way between the pharyngeal and the posterior end. Length of an ordinary specimen when crawling 70 mm. by 1 to 1½ mm. in width. In spirit the yellow colour is completely dissolved out, leaving the worm white; the stripes are darkened somewhat at same time, probably by removal of the light yellow pigment. Occasional specimens are strongly tinged all over with green, giving them a peculiar yellow-green appearance.

I have also found specimens in which the brown lines fade out less than half way down the back, leaving the posterior half of the dorsal surface pale yellow. In no case have I seen any trace of a median dorsal line such as characterises *G. mediolineata*, Dendy.

The egg capsule is of chocolate-brown colour, about 2½ to 3 mm. diam. One which I found early in February, 1897, and which hatched out immediately after, contained eight young ones, which were about 3 mm. in length. The eyes in these were plainly marked in a single row round the anterior tip and right down the sides. The brown colour of the tip and the dorsal lines for a short distance back were also visible; the body colour was pale yellow.

Type specimen in Australian Museum; register number G. 1510.

Hab.—Bundanoon, N.S.W.

This handsome planarian is exceedingly abundant at Bundanoon (Moss Vale District), and I have noticed large numbers of it during the last three summers.

I have pleasure in associating the name of my friend, Mr. J. P. Hill, F.L.S., with this species in recognition of his kindly assistance in collecting planarians for me.

GEOPLANA PONDEROSA, n.sp.

(Pl. VI. fig. 3.)

Ground colour of dorsal surface pale sulphur-yellow. A fairly large specimen in spirit has a median dorsal space of ground colour about 1 mm. in width, bounded on either side by a band of about same width of speckled dark grey, well defined on its inner margin and diffuse on its outer. Next to this is another space of ground colour about 1½ mm. wide, which again is bounded by a strong dorso-lateral sharply defined black band—dark brown in life—1 mm. in diameter. The margins round to the ventral surface are of the yellow ground colour. The sides bulge out a good deal, while the dorsal surface is very slightly arched, and the ventral quite flat, so that when the animal is crawling the surface is in close contact with the ground. Between the central bands and the lateral ones, and in the marginal space outside of these, the dorsal surface is sparingly peppered with minute dark brown punctations. At the anterior end all the bands blend into a brown tip, while at the posterior end the central space of ground colour continues right out, the marginal band on either side sweeping round and joining the corresponding inner band. The ventral surface uniform yellow, paler than the dorsal.

Eyes large and conspicuous, single row round anterior tip, not much side grouping, continued sparsely for some distance down the sides.

The specimen above described when alive and crawling was 250 mm. (10 inches) long by 6 mm. broad ; in spirit it is 163 mm. (6½ inches) in length. The opening to the pharynx is 87 mm. from anterior end, and the genital opening 41 mm. behind that. Another spirit specimen 131 mm. long has the relative positions of the apertures, as above, 78 mm. and 28 mm. respectively.

Type specimen in Australian Museum; register number G. 1511.

Hab.—Bundanoon, N.S.W.

This is the most massive land planarian with which I have met. I have collected specimens of *G. variegata*, F. & H., almost as long as my largest finds of this species, but as a rule these are not nearly so thick in proportion to their length. It is readily distinguished from the allied form *G. variegata* by its yellow colour, the diffuse central bands and the narrowness and sharp definition of the dorso-lateral bands. In spirit the yellow colour dissolves, leaving the body nearly white, but without altering the bands, save to slightly darken them.

Like *G. variegata* this is an exceedingly sticky planarian, the slime with which the body is coated being extremely tenacious and plentiful. Both these species are very sluggish during the summer months—the only period when I have collected them—and appear to be æstivating, although other species are feeding freely.

GEOPLANA ROBUSTA, n.sp.

(Pl. VI. fig. 4.)

Ground colour of dorsal surface lemon-yellow. A pair of very bold sharply defined bands 1 mm. wide enclose a median space of ground colour also 1 mm. in width. The bands vary in colour from black to rich brown, their margins very dark, getting lighter towards the centre through the ground colour showing through faintly, and giving them a somewhat speckled appearance. Towards the ends the bands taper symmetrically to fine points which join near the tips. Along the margins of the dorsal surface there is a faint line of specklings of same colour as the main stripes. The anterior tip is rich brown. Ventral surface a somewhat paler shade of the same colour as the dorsal, without any markings. Length of average specimens in spirit 40 to 50 mm. by 4 mm. in diameter. In a spirit specimen 48 mm. long the pharyngeal opening is 28 mm. from anterior tip, and the genital 11 mm. further back. Another one 42 mm. has the former distance 27 mm. and the latter 7 mm.

Eyes large and readily seen, arranged as usual in single row round the anterior tip, and grouped, though somewhat sparingly, at the sides, continuing in a drawn out line for some way down the sides.

Type in Australian Museum; register number G. 1512.

Hab.—Bundanoon, N.S.W.

In shape this species resembles *G. Fletcheri*, Dendy, from which it is distinguished by the sharp definition of the stripes, together with the entire absence of any indication of a dorso-median line or of scattered specklings on dorsal surface.

Associated with the type I have noticed numbers of a most beautiful form in which the ground colour of both surfaces is a translucent pearly white, and the bands rich brown.

This is the only planarian which I have observed preying on other planarians. When collecting I found it necessary to put specimens of this species in a box by themselves, as they attacked and devoured such forms as *G. sanguinea*, *G. Hillii*, *G. quinquelineata*, &c. I have seen this and other species feeding on earth worms as well as insects. On removing a planarian from an earth worm on which it was feeding, I observed a round hole or puncture in the skin of the earthworm into which the planarian had its oral organ inserted.

GEOPLANA ALBOLINEATA, n.sp.

(Pl. VII. fig. 8.)

The median dorsal line is pure white, about $\frac{1}{3}$ mm. in diameter, and is bounded on either side by a dark line of about twice its width. This line is grey-black on its inner side next the white line, and intense black on its outer edge. As it approaches the anterior tip it gradually assumes a rich chocolate-brown colour, the intense margin disappearing, and the whole merging into the tip which is brown. The margins of the dorsal surface are light sulphur-yellow. Ventral surface sulphur-yellow somewhat paler than that of the dorsal.

The eyes are conspicuous, and are arranged as in *G. Hillii* before described. In the specimens examined I did not detect any side grouping of the eyes.

The pharyngeal opening in spirit about midway between the ends, and the genital aperture rather less than half-way between this and the posterior end. A specimen alive at rest was 45 mm. in length by $1\frac{1}{2}$ mm. broad, and when crawling lengthened to 60 mm.

In section the body in life is very angular, forming almost a triangle, with the ventral surface for the base.

Type in Australian Museum; register number G. 1513.

Hab.—Bundanoon, N.S.W.; under logs in a shady gully; a somewhat scarce species.

The strong contrasts of white, black, yellow and brown make this little planarian very striking and handsome.

GEOPLANA QUINQUELINEATA, var. ACCENTUATA, var.nov.

(Plate VII. figs. 6-7.)

In their paper already mentioned, Messrs. Fletcher and Hamilton describe *G. quinquelineata* from a series of specimens collected in various parts of New South Wales, and at Sandhurst, Victoria. From their description it is evident that the type of the species has the median dorsal line, if anything, rather less decided than the lateral and marginal ones. In the note at the end of their description, special mention is made of the Victorian specimens and some of the New South Wales ones having the median line more strongly coloured than the others, and it is indicated that they expected at least varietal differences to be established when larger suites of specimens came to be examined.

I have been able to study a large series of specimens of this species from the Blue Mountains and Bundanoon in New South Wales, and from a considerable number of localities in Victoria, as well as from the Nerang River, Queensland. Without exception all my Queensland and Victorian specimens have the median dorsal line much accentuated and darker in colour than the other lines, while all my New South Wales ones have no such distinction, the median line being usually the least strongly marked of all. A number of specimens from various parts of Victoria, identified by Dr. Dendy as belonging to this species, and given to me by him, also agree in every way with my own specimens from that colony.

Mr. Fletcher has, with me, compared my specimens with those collected by Mr. Hamilton and himself, and we are agreed that the form having the dark median line should be considered as a variety of *G. quinquelineata*, the form with the uniform slender lines being regarded as the type of the species.

The new variety is readily distinguished from the species by the bold dark median line. After keeping in spirit for some time the distinction becomes even more strongly marked, in some specimens the lateral and marginal lines having almost vanished by bleaching, while the median one remains strong and conspicuous.

So far as my own observation goes the species is confined to New South Wales, while all the specimens from Victoria or Queensland which I have seen belong to the variety.

The eyes are very numerous, and in well preserved specimens are conspicuous and readily seen. Round the anterior tip in a single row as usual, thickly grouped, a few mm. behind the tip, at which part they extend on to the dorsal surface as far as to encroach on the lateral stripes. An irregular wavy line of eyes extends along the sides to the extreme posterior end.

Type specimen in Australian Museum; register number G. 1514.

In a paper published in 1891,* Professor Spencer describes and figures a planarian from the Upper Yarra, Victoria, as a variety of *G. mediolineata*, Dendy, coming between that species and *G. quinquelineata*, F. & H. I am of the opinion that this specimen is a somewhat abnormal example of the present variety.

For the following species from Southern Queensland sent to me, some alive and some in an excellently preserved state, I have to thank my brother, Mr. John S. Steel, whose descriptive notes on the living worms have been most useful to me.

GEOPLANA ELEGANS, n.sp.

(Pl. VI. fig. 2.)

In the median line of the dorsal surface in a specimen of ordinary size is a bold sharp pale brown band, about $\frac{3}{4}$ mm. broad, extending from tip to tip. In the centre of this band there is a very narrow line of pure white running its length in the centre. On either side of the median line a broad band of dark brown, varying to dark olive, bro aest in the middle, where it is rather more than twice the width of the median line and tapering gently to each end. The outer margin of this band is of a much darker tint than the remainder of it. The remaining space to the margin of the body, nearly as wide as the broad band just described, corresponds in tint with the median space, and close to its outer margin is a fine line composed of specklings of same colour as the broad bands. On either side of this line there is frequently a still finer faint line likewise composed of specklings, which specklings may be more or less diffused over the marginal surface.

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* Proc. R. S. Victoria, 1891, pp. 86 and 93, Pl. 12, fig. 15.

The ventral surface has a middle space of pearly white, corresponding to the ambulacral zone of *Bipalium Kewense*, rather more than 1 mm. wide at the centre and tapering to the ends. In this zone are situated the external apertures. Between the white central zone and the margins is uniformly speckled with brown, the edges of the bands so formed being delicately pencilled out by the specklings crowding together. The intermediate specklings are frequently arranged to form a series of longitudinal interrupted lines.

Eyes numerous and conspicuous, forming a single row round the anterior tip, extensively and densely grouped on the sides close to the tip and extending backwards in a single row for a few mm., the side grouping extending upwards almost to the dorso-lateral bands.

Pharyngeal aperture midway between the ends, and genital opening again midway between that and the posterior end. Both apertures are very conspicuous.

In spirit, a fair sized specimen 38 mm. long by 5 mm. wide. Another medium specimen 32 mm. by 4 mm.

Type in Australian Museum; register number G. 1515.

Hab.—Nerang River, Southern Queensland (Mr. John S. Steel).

In general shape this species resembles *G. Fletcheri*, Dendy, but does not taper so abruptly to the posterior end. It is a very handsome and distinct species and was found by Mr. John S. Steel fairly common under logs on the Nerang River, Southern Queensland.

GEOPLANA PARVA, n.sp.

(Pl. VI. fig. 1.)

The dorsal surface has in the middle a tapering band of yellow, in the median line of which is a very narrow but strongly marked line of dark brown. The yellow band tapers off towards the anterior extremity and comes to a fine point about 2 mm. from the tip, but extends quite out to the posterior end.

The space on either side of the yellow band right to the margins, and also round the anterior tip, is of a rich chocolate brown, darkest on its inner margin. This area thus forms a pair of broad marginal stripes. Close inspection shows that these bands are really covered with close stipplings of brown, the yellow body colour showing through. Towards the outer margins the stipplings are thinner and the surface has there a mottled appearance of mixed yellow and brown.

On the ventral surface there is a median white space corresponding in position and dimensions with the dorsal yellow band, in which, as in the previous species, the external apertures are situated. The marginal area on either side of the clear space is thickly speckled with light brown spots. These spots are well defined and distinct, not running into one another to form stipplings.

Eyes conspicuous, arranged as usual in a single row round the anterior tip, thickly grouped a short distance back, the grouping extending well up on the brown bands nearly to the margin of the median yellow area; any continuation of the eyes backwards was not observed more than a few mm. from the grouping.

The pharyngeal aperture is about the centre of the ventral surface, and the genital opening midway between this and the posterior end; both apertures conspicuous.

Length in spirit 15 mm. by 2½ mm. at widest part.

In shape exactly resembling *G. elegans* before described, but much smaller in size.

Type in Australian Museum; register number G. 1516.

Hab.—Nerang River, Southern Queensland (Mr. John S. Steel).

This beautiful little planarian in general appearance resembles small specimens of *G. elegans*, but is at once distinguished by the dorso-median narrow brown line and by the spotted nature of the markings on the ventral surface. It appears to be the smallest Australian land planarian yet described, the next smallest being *G. minor*, Dendy,* from Burnett River and Cooran, Queensland, the length of which is given by Dr. Dendy as 18 mm., while the present species is just 15 mm., both measurements being of spirit specimens.

G. parva is apparently a scarce species, as only two individuals, both of the same dimensions, were found by the collector—Mr. John S. Steel—after a prolonged search.

RHYNCHODEMUS GUTTATUS, F. & H.

Rhynchodemus guttatus, Fletcher and Hamilton, Proc. Linn. Soc. N.S.W. (Ser. 2), Vol. ii. p. 373; *Rhynchodemus Victoriæ*, var. *Steelii*, Dendy, Proc. Linn. Soc. N.S.W. (Ser. 2), Vol. ix. p. 733.

Mr. Dendy named this variety from specimens collected by the writer on the Blue Mountains, N.S.W. Through the courtesy of Mr Fletcher, I have been able to compare some of the specimens with which I supplied Dr. Dendy with the original types of Messrs. Fletcher and Hamilton; and Mr. Fletcher and myself are agreed that they are identical. Such being the case, I have thought it well to take the first opportunity of recording this correction. When Messrs. Fletcher and Hamilton described the species, curiously enough the two specimens which they had chanced to be what appears to be a somewhat uncommon form, having spots on the ventral surface. Since then these gentlemen have got a number of further specimens, and I also have collected a good series from the Blue Mountains and Bundanoon, N.S.W.; and from an examination of all these it is evident that they are one and the same species, which was originally described as *R. guttatus*, F. and H. The spots in the first specimens are evidently a minor character, for the specimens agree exactly in every other respect.

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* Proc. R. S. Vict. 1892, p. 125.

Typical specimens in Australian Museum; register number G. 1532.

During my study of the land planarian worms, I have experienced the greatest trouble in clearing up doubtful points of identity owing to the published descriptions being in many cases quite inadequate, and the types not being available for reference. With a view to doing what I can to obviate this state of matters for future students, I have deposited in the Australian Museum, Sydney, the types of all the species described in this paper. I have further placed in the same institution as complete a set as I am able of typical specimens of previously described Australian forms, which I hope to supplement from time to time, and I would appeal to naturalists whenever possible to follow a similar course. I am also sending a similar series to the British Museum of Natural History in order to supplement the collection already placed there by other workers in Australia.

Part ii.—Collection and Preservation.

It will be unnecessary for me to say anything about the situations in which land planarians are to be met with, as this matter has already been fully dealt with by Messrs. Fletcher and Hamilton, and by Professors Dendy and Spencer in their various papers. When collecting I usually carry a few small tin boxes or wide-mouthed bottles, the covers or corks of which fit fairly close but are readily removed. Into these I put some fresh green leaves or damp moss, which permits of the worms being carried for considerable distances without injury. During very hot weather I have found it a good plan to carry the boxes in a little wallet, each box being wrapped in a cotton rag kept moist with water. By keeping the boxes cool, this prevents the destruction of the worms by the heat.

In cool weather no such precautions are necessary, and I have kept the animals alive amongst damp moss in a cool place for weeks at a time. Planarians are creatures which cannot be advantageously preserved by putting at once into spirit, so that at all times it is desirable for the collector to take them home alive.

When such soft-bodied creatures are to be preserved it is necessary to use some fluid medium such as alcohol, for they cannot be dried without destroying all recognisable characters. If put direct into spirit, many planarians break into fragments owing to the forcible contraction induced, or become twisted or curled so as to render their future examination a matter of some difficulty.

Again, they are all more or less covered with a slimy secretion, which, being coagulated by the spirit, forms a white opaque coating adhering tenaciously to the surface of the animal, and so effectually masking the characteristic bands and markings as to frequently render identification difficult or uncertain, besides usually completely obscuring the eyes.

In preserving these worms—and I may here state that earthworms may be advantageously treated in precisely the same manner—I first of all kill them with very weak spirit The strength which I prefer is 1 of ordinary methylated spirit to 15 or 20 of water.

The worms are simply dropped into this weak spirit contained in a shallow dish, and die in about 10 or 15 minutes without the slime becoming coagulated or the worm breaking into pieces. I now take them up one at a time by means of a pair of weak-springed flat-bladed forceps, and with the aid of my wetted fingers gently draw the blades of the forceps along the worm's body, slightly compressing the body between them, and in this way scrape off the slime, wiping the forceps on a piece of rag. With a little care this can be done readily and safely even with the most delicate planarians, and leaves them beautifully clean and free from the objectionable slime. It is necessary to keep the fingers moist, otherwise the worm will stick and become damaged.

Having the strong spirit (80 to 85 per cent.) in another shallow dish, the worm is gently laid in it and by means of fingers and forceps flattened and straightened out and prevented from shrinking too much as the spirit hardens it. A few minutes suffices for this, and it is now left while the others are being similarly treated. When all are finished they are transferred, with strong spirit, to the tubes or bottles in which they are to be preserved.

The great drawback to the use of spirit in preserving these worms is the solubility of the colouring matter of many of them in that menstruum.

The beautiful yellow and green tints are completely removed, leaving the previously elegantly coloured parts bleached and white, the spirit meantime becoming yellow.

Fortunately the colours soluble in spirit are usually confined to the areas of body colour; the characteristic bands, lines, &c, being of a dark pigment which is but slightly affected thereby. I have made numerous experiments with the view to preserve land planarians in their natural colours It is necessary to use some medium which, while capable of preserving the animals, does not dissolve or destroy the colour. I have tried a large number of substances, such as different strengths of Formaline, alone and combined with spirit. various saline solutions, &c, and though I have failed to discover a medium entirely to my satisfaction, it is perhaps as well to record such amount of success as I have had. The preservative which I have found to answer best of all is chloroform. So far as preserving the colours is concerned it answers perfectly, but its high specific gravity—causing specimens to float—and its volatility, are somewhat serious objections. Common kerosene is another medium which, while not so efficient as chloroform, gives a very good retention of colour.

Before putting into either chloroform or kerosene, it is necessary to harden the specimen a little in strong spirit, the action of this being to displace water from the tissues.

The worms are killed and cleaned as already described and then put in strong spirit until the colour is seen to just begin tinging the spirit. Each specimen is laid for a moment on a piece of blotting paper to remove surplus spirit, and then put direct into the chloroform or kerosene.

As the planarians remain rather limp and sticky, and consequently difficult to handle, and to prevent from adhering to one another, it is perhaps best to lower them vertically into the empty dry tube or bottle, and to press them gently against the side. They will then adhere, and when all are in the preserving medium may be poured in. Alcohol and kerosene do not mix, and though with small specimens the kerosene appears able to displace the spirit, this is not the case with large bulky planarians. When such are being dealt with—and indeed in all cases—it is well to submit them to a preliminary soaking in chloroform after taking out of the spirit used for hardening. Chloroform is miscible with both spirit and kerosene, and so effects the thorough displacement of the former by the latter. An objection to kerosene is its general messiness and tendency to soak out through the cork. This latter propensity can be overcome by making use of good corks and varnishing them all over with strong shellac in spirit, allowing to dry thoroughly before using.

I have further made a few trials with kerosene for preserving such objects as the common green Cicada, Phasmids, &c., which in spirit become of an ugly red colour, and I find it, when properly used, to answer very well, causing them to retain their natural green colour. The specimens which I exhibit have been preserved for about five months.

Insects, spiders, &c., which it is desired to preserve in kerosene should have the body slit open and soaked in strong spirit in order to displace the water from the tissues, which would otherwise decay; they are then transferred to chloroform, in which they may be left indefinitely, being finally transferred to kerosene.

In one of his recent Annual Reports, Mr. A. Haly, Curator of the Colombo Museum, gives an account of some trials of carbolised oil for preserving in their natural shape and colour various vertebrates, such as fish, frogs, snakes, lizards, &c., and also crustaceans and spiders.

I have made a few trials with this medium, and find that it preserves the colours of land planarians excellently, the extremely fugitive tints of such forms as *Geoplana sanguinea* and *G. Hillii*, being retained almost perfectly. At present I have in hand a series of experiments for the purpose of finding the best method of applying this preservative to general natural history specimens, and should I arrive at any results of value I propose at a future time to communicate them to the Society.

It should be borne in mind that no preserving medium will prevent the bleaching of any of these objects by light, and it is necessary with land planarians as with the others to keep them as much as possible in darkness, or at least away from strong light.

EXPLANATION OF PLATES.

Plate VI.

Fig. 1.—*Geoplana parva.*
Fig. 2.—*Geoplana elegans.*
Fig. 3.—*Geoplana ponderosa.*
Fig. 4.—*Geoplana robusta.*

Plate VII.

Fig. 5.—*Geoplana Hillii.*
Fig. 6.—*Geoplana quinquelineata.*
Fig. 7.— ,, ,, var. *accentuata.*
Fig. 8.—*Geoplana albolineata,*
Fig. 10.—*Geoplana atrata.*